Listing of Claims:

1. (Original) A method for determining a portion of locomotion and a phase of locomotion portion in view of controlling an actuated prosthesis in real time, the method comprising:

providing a plurality of main artificial proprioceptors;

receiving a data signal from each of the main artificial proprioceptors;

obtaining a first and a second derivative signal of at least some of the data signals;

obtaining a third derivative signal for at least one of the data signals;

using ~~a~~ set of a first state machines to select one state among a plurality of possible states for each main artificial proprioceptor with the corresponding data and derivative signals;

generating the phase of locomotion portion using the states of the main artificial proprioceptors; and

using a second state machine to select the portion of locomotion among a plurality of possible portions of locomotion using events associated to the data signals.

2. (Original) The method according to claim 1, further comprising:

pre-processing the data signals before obtaining the derivative signals.

3. (Original) The method according to claim 2, wherein the pre-processing comprises:

filtering the data signals; and

normalizing the data signals; and

binary formatting the data signals for adapting them to input specifications of the first state machines.

4. (Currently Amended) The method according to claim 3, ~~where in~~ wherein the step of normalizing the data signals comprises:

converting the data signals using first conversion coefficients obtained during a zero-calibration procedure; and

converting the data signals using second conversion coefficients obtained during a weight-calibration procedure.

5. (Original) The method according to claim 1, wherein the main artificial proprioceptors include plantar pressure sensors, the method comprising:

sensing the plantar pressure at a plurality of locations, the data signals from the plantar pressure sensors being indicative of the plantar pressure at these locations.

6. (Original) The method according to claim 5, further comprising auxiliary artificial proprioceptors, the auxiliary artificial proprioceptors including an angular position sensor provided between two movable parts of the prosthesis, the method comprising:

generating a data signal indicative of the angular position between the two movable parts, the data signal from the angular position sensor being used in at least one of the events in the second state machine.

7. (Original) The method according to claim 5, further comprising auxiliary artificial proprioceptors, the auxiliary artificial proprioceptors including two angular velocity sensors, one being provided on a shank of a non-amputee leg and the other being on a residual limb, the method comprising:

generating data signals indicative of the angular velocity measured at each angular velocity sensor, the data signals from the angular velocity sensors being used in at least one of the events in the second state machine.

8. (Original) The method according to claim 5, wherein the plantar pressure is sensed for at least four locations, two of the locations being at a right foot and two of the locations being at a left foot.

9. (Original) The method according to claim 8, wherein one of the locations at the right foot and one at the left foot are at a calcaneus region, another one of the locations at the right foot and one at the left foot are at a metatarsophalangeal region.

10. (Original) The method according to claim 9, wherein the right and left plantar pressure sensors are provided in corresponding insoles.

11. (Original) The method according to claim 9, wherein one of the feet is an artificial foot, the other being a natural foot.

12. (Original) The method according to claim 9, wherein both feet are artificial feet.

13. (Original) The method according to claim 9, wherein the step of obtaining the third derivative signal for at least one of the data signals comprises:

obtaining the third derivative for the data signal indicative of the plantar pressure at the calcaneus region of the right foot; and

obtaining the third derivative for the data signal indicative of the plantar pressure at the calcaneous region of the left foot.

14. (Original) The method according to claim 13, further comprising:

calculating complementary signals from at least some of the data signals, the states of the main artificial proprioceptors being selected with data, complementary and derivative signals.

15. (Original) The method according to claim 14, wherein the step of calculating complementary signals comprises:

calculating a first complementary signal using the data signals indicative of the plantar pressure at the calcaneus region and at the metatarsophalangeal region of the left foot;

calculating a second complementary signal using the data signals indicative of the plantar pressure at the calcaneus region and at the metatarsophalangeal region of the right foot;

calculating a third complementary signal using the data signals indicative of the plantar pressure at the calcaneus region of the right foot and that of the left foot;

calculating a fourth complementary signal using the data signals indicative of the plantar pressure at the metatarsophalangeal region of the right foot and that of the left foot; and

calculating a fifth complementary signal using the data signals indicative of the plantar pressure at the calcaneus region of the right foot and that of the left foot, and the metatarsophalangeal region of the right foot and that of the left foot.

16. (Original) The method according to claim 1, wherein the step of generating the phase of locomotion portion using the states of the main artificial proprioceptors comprises:

appending binary labels representing the state of each main artificial proprioceptor to create a binary label representing the phase of locomotion portion.

17. (Original) The method according to claim 1, wherein the step of receiving the data signal from each of the main artificial proprioceptors comprises:

receiving at least some of the data signals from a wireless transmission.

18. (Currently Amended) A method for controlling an actuated prosthesis in real time, the method comprising:

providing a plurality of main artificial proprioceptors;

receiving a data signal from each of the main artificial proprioceptors;

obtaining a first and a second derivative signal for at least some of the data signals;

obtaining a third derivative signal for at least one of the data signals;

using a set of first state machines to select one state among a plurality of possible states for each main artificial proprioceptor with the corresponding data and derivative signals;

generating ~~the~~ a phase of locomotion portion using the states of the main artificial proprioceptors;

using a second state machine to select the portion of locomotion among a plurality of possible portions of locomotion using events associated to the data signals;

calculating a locomotion speed value;

determining coefficient values from a lookup table using the phase of locomotion portion, the portion of locomotion and the locomotion speed value;

calculating at least one dynamic parameter value of the actuated prosthesis using the coefficient values from the lookup table and at least some of the data signals; and

converting the dynamic parameter value into an output signal to control the actuated prosthesis.

19. (Currently Amended) The method according to claim 18, wherein the step of determining coefficient values from the lookup table comprises using the phase of locomotion portion,

the portion of locomotion, the locomotion speed value and the data signals, the data signals being in binary format~~ted~~.

20. (Original) The method according to claim 18, wherein the actuated prosthesis is an actuated leg prosthesis for above-knee amputees, the step of calculating at least one dynamic parameter value comprising:

calculating at least one torque value and angular position value.

21. (Original) The method according to claim 19, wherein the actuated prosthesis includes an actuator using electric power, the output signal being indicative of the electrical power to be supplied to the actuator.

22. (Original) The method according to claim 21, further comprising:

adjusting the output signal in response to at least one feedback signal received from the prosthesis.

23. (Original) The method according to claim 22, wherein there are at least a first and a second feedback signal, the first feedback signal being indicative of a relative angular position measured between two movable parts of a knee joint, and the second feedback signal being indicative of a torque value measured between the two movable parts.

24. (Original) The method according to claim 18, further comprising the initial step of:

processing experimental data to create the lookup table.

25. (Original) The method according to claim 18, further comprising:

pre-processing the data signals before obtaining the derivative signals.

26. (Original) The method according to claim 25, wherein the pre-processing comprises:

filtering the data signals;

normalizing the data signals; and

binary formatting the data signals for adapting them to input specifications of the first state machines.

27. (Original) The method according to claim 26, wherein the step of normalizing the data signals comprises:

converting the data signals using first conversion coefficients obtained during a zero-calibration procedure; and

converting the data signals using second conversion coefficients obtained during a weight-calibration procedure.

28. (Original) The method according to claim 18, wherein the main artificial proprioceptors include plantar pressure sensors, the method comprising:

sensing the plantar pressure at a plurality of locations, the data signals being indicative of the plantar pressure at these locations.

29. (Original) The method according to claim 28, further comprising auxiliary artificial proprioceptors, the auxiliary artificial proprioceptors including an angular position sensor provided between two movable parts of the prosthesis, the method comprising:

generating a data signal indicative of the angular position between the two movable parts, the data signal from the angular position sensor being used in at least one of the events in the second state machine.

30. (Original) The method according to claim 28, further comprising auxiliary artificial proprioceptors, the auxiliary artificial proprioceptors including two angular velocity sensors, one being provided on a shank of a non-amputee leg and the other being on a residual limb, the method comprising:

generating data signals indicative of the angular velocity measured at each angular velocity sensor, the data signals from the angular velocity sensors being used in at least one of the events in the second state machine.

31. (Original) The method according to claim 28, wherein the plantar pressure is sensed for at least four locations, two of the locations being at a right foot and two of the locations being at a left foot.

32. (Original) The method according to claim 31, wherein one of the locations at the right foot and one of the locations at the left foot are at a calcaneus region, another one of the locations at the right foot and one of the locations at the left foot are at a metatarsophalangeal region.

33. (Original) The method according to claim 32, wherein the right and left plantar pressure sensors are provided in corresponding insoles.

34. (Original) The method according to claim 32, wherein one of the feet is an artificial foot, the other being a natural foot.

35. (Original) The method according to claim 32, wherein both feet are artificial feet.

36. (Original) The method according to claim 32, wherein the step of obtaining the third derivative signal for at least one of the data signals comprises:

obtaining the third derivative for the data signal indicative of the plantar pressure at the calcaneous region of the right foot; and

obtaining the third derivative for the data signal indicative of the plantar pressure at the calcaneous region of the left foot.

37. (Original) The method according to claim 36, further comprising:

calculating complementary signals from at least some of the data signals, the states of the main artificial proprioceptors being selected with data, complementary and derivative signals.

38. (Original) The method according to claim 37, wherein the step of calculating the complementary signals comprises:

calculating a first complementary signal using the data signals indicative of the plantar pressure at the calcaneus region and at the metatarsophalangeal region of the left foot;

calculating a second complementary signal using the data signals indicative of the plantar pressure at the calcaneus region and at the metatarsophalangeal region of the right foot;

calculating a third complementary signal using the data signals indicative of the plantar pressure at the calcaneus region of the right foot and that of the left foot;

calculating a fourth complementary signal using the data signals indicative of the plantar pressure at the metatarsophalangeal region of the right foot and that of the left foot; and

calculating a fifth complementary signal using the data signals indicative of the plantar pressure at the calcaneus region of the right foot and that of the left foot, and the metatarsophalangeal region of the right foot and that of the left foot.

39. (Original) The method according to claim 18, wherein the step of generating the phase of locomotion portion using the states of the main artificial proprioceptors comprises:

appending binary labels representing the state of each main artificial proprioceptor to create a binary label representing the phase of locomotion portion.

40. (Original) The method according to claim 18, wherein the step of receiving the data signal from each of the main artificial proprioceptors comprises:

receiving at least some of the data signals from a wireless transmission.

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